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# Successful Project Applications of Accelerated Bridge Construction in California

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Caltrans- Bridge Design



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# Mission & Vision

Caltrans Improves Mobility Across  
California



# Accelerated Bridge Construction

- ABC means:
  - Accelerated Project Delivery (APD)
    - Delivering bridge construction projects sooner
  - Reducing impacts from bridge construction
    - Traveling Public
    - Environment
    - Local Businesses
    - Other
  - Improving constructability, product quality and performance



# Caltrans ABC Strategic Plan

1. “Lessons” Learned Report and Survey
2. ABC Selection Criteria and Implementation
3. Industry Engagement
4. Construction Specifications Development
5. Technical Research and Development
6. Project Implementation- Pilot Program



# Caltrans Successful ABC Projects

## Delivering Bridge Construction Projects Sooner

- I-580 Connector
- I-5 Truck Route UC
- Russian River Bridge Replacement



# Caltrans Successful ABC Projects

## I-580 Connector Span Replace



Gasoline tanker overturned on I-880 in Oakland, California-

April 29, 2006 at 3:52 AM

– Fire and extreme heat from the tanker fire

– Extreme heat caused the collapse of 2-spans on I-580  
Upper Connector: steel girders and steel bent cap



## I-580 Connector Span Replace

Two spans collapse

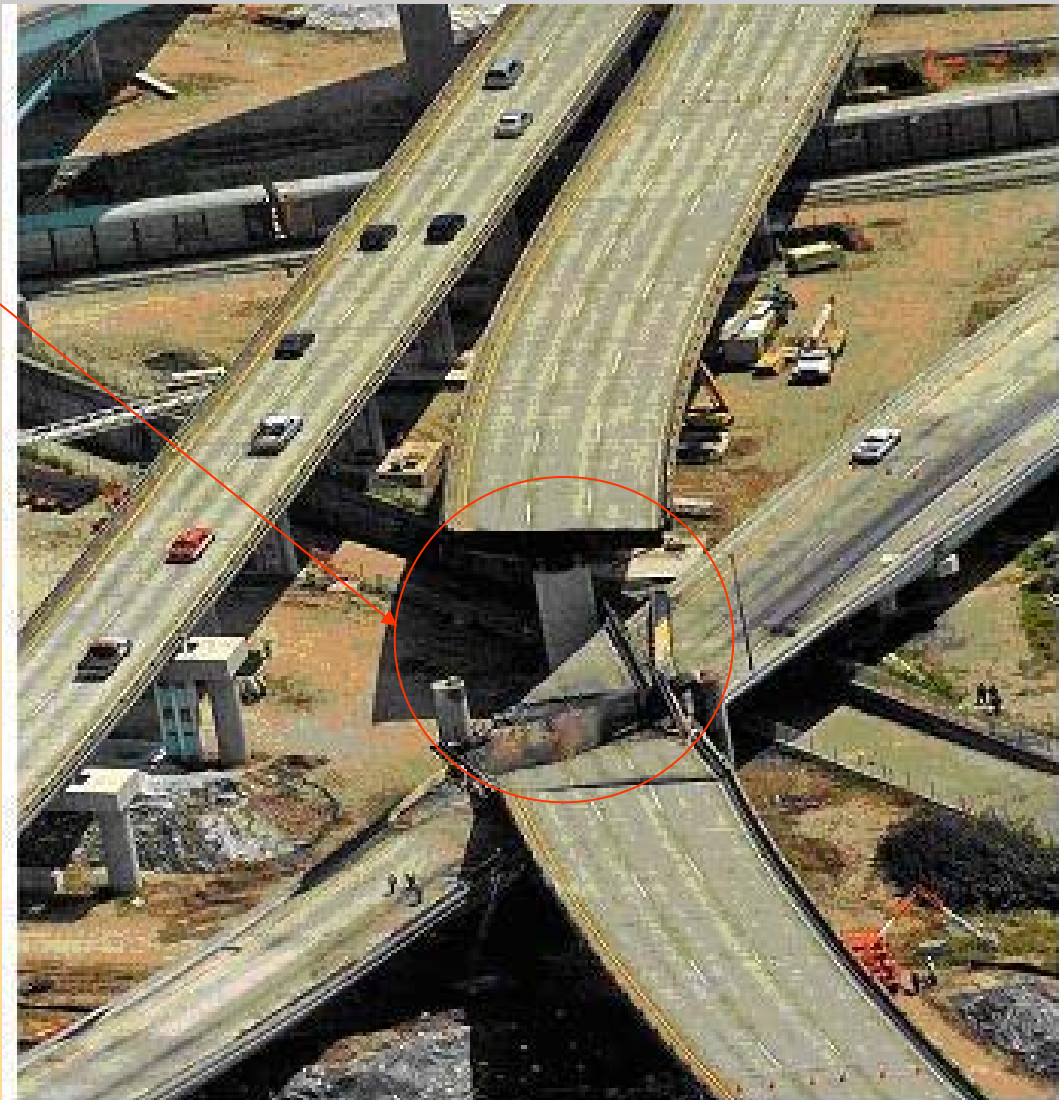


Figure 2: View of damage from above



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## I-580 Connector Span Replace



Construction contract awarded on May 7

Completed May 24, 2007, less than 20 days





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## I-5 Truck Route UC- Repair Santa Clarita, California





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# Russian River Bridge- Emergency Replace





# Caltrans Successful ABC Projects

## Reducing Impacts From Bridge Construction

- Hardscrabble Creek
- SFOBB



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# Hardscrabble Creek - Video





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## SFOBB Yerba Buena Island Viaduct - Video

San Francisco - Oakland Bay Bridge

South-South Detour Project  
West Tie-In  
Phase 1

Construction & Demolition  
labor Day Weekend - 2007



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# SFOBB Yerba Buena Island Viaduct Superstructure Roll-In Move- Total 2.5 days





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## SFOBB Yerba Buena Island Viaduct



Superstructure Roll-In Move



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# Caltrans Successful ABC Projects

Delivering Bridge Construction Projects Sooner  
& Reducing Impacts From Bridge Construction

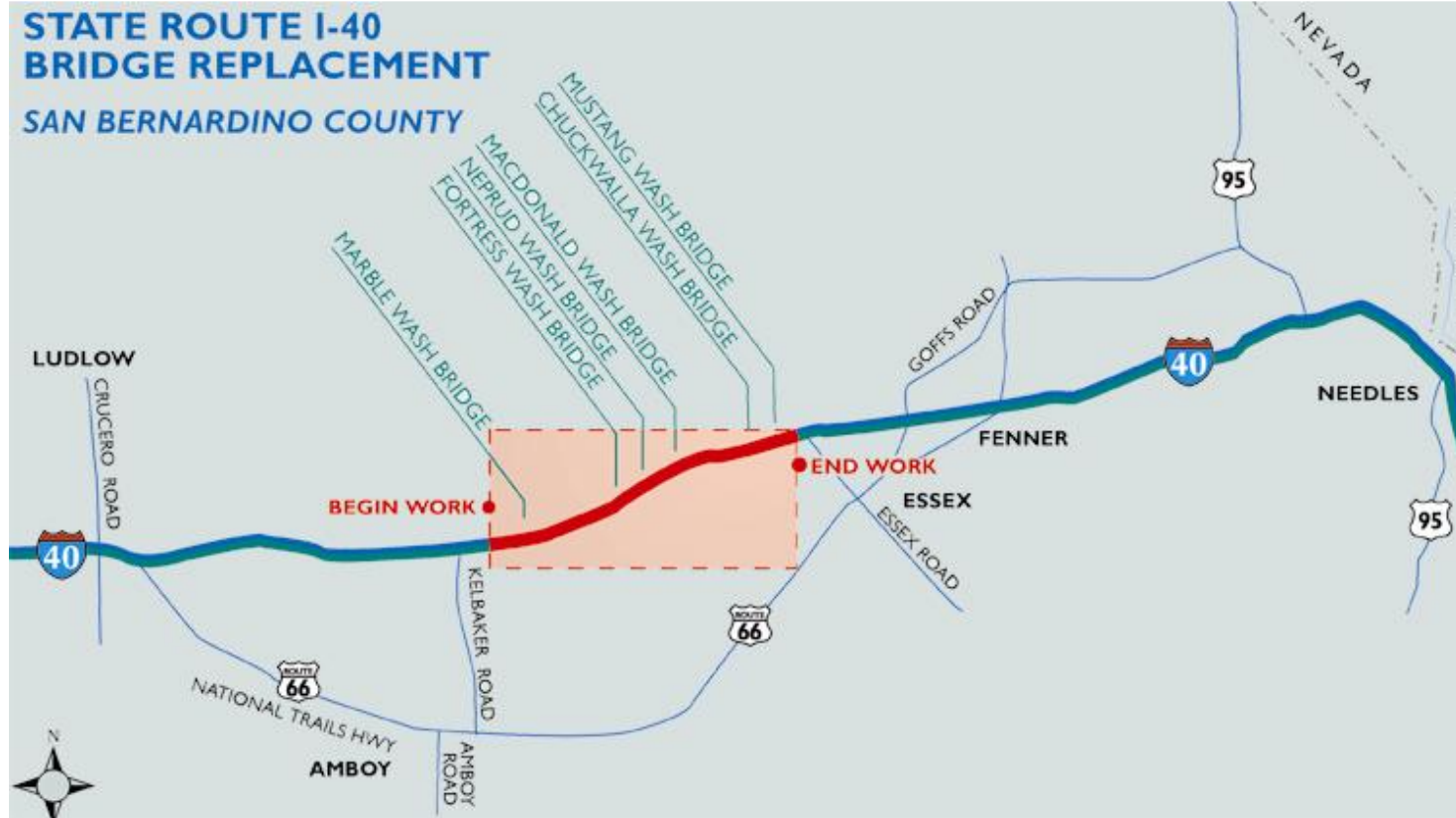
- I-40 Bridge Replacements





## I-40 Bridge Replacement Project

- Total six structure locations
- ABC strategy employed to the bridge replacement
- Precast girder and precast abutment utilized first time





## I-40 Bridge Replacement Project

- Precast girder for superstructure





## I-40 Bridge Replacement Project

- Precast abutment





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## I-40 Bridge Replacement Project



Bridge completed in 28 days- from closure to reopening



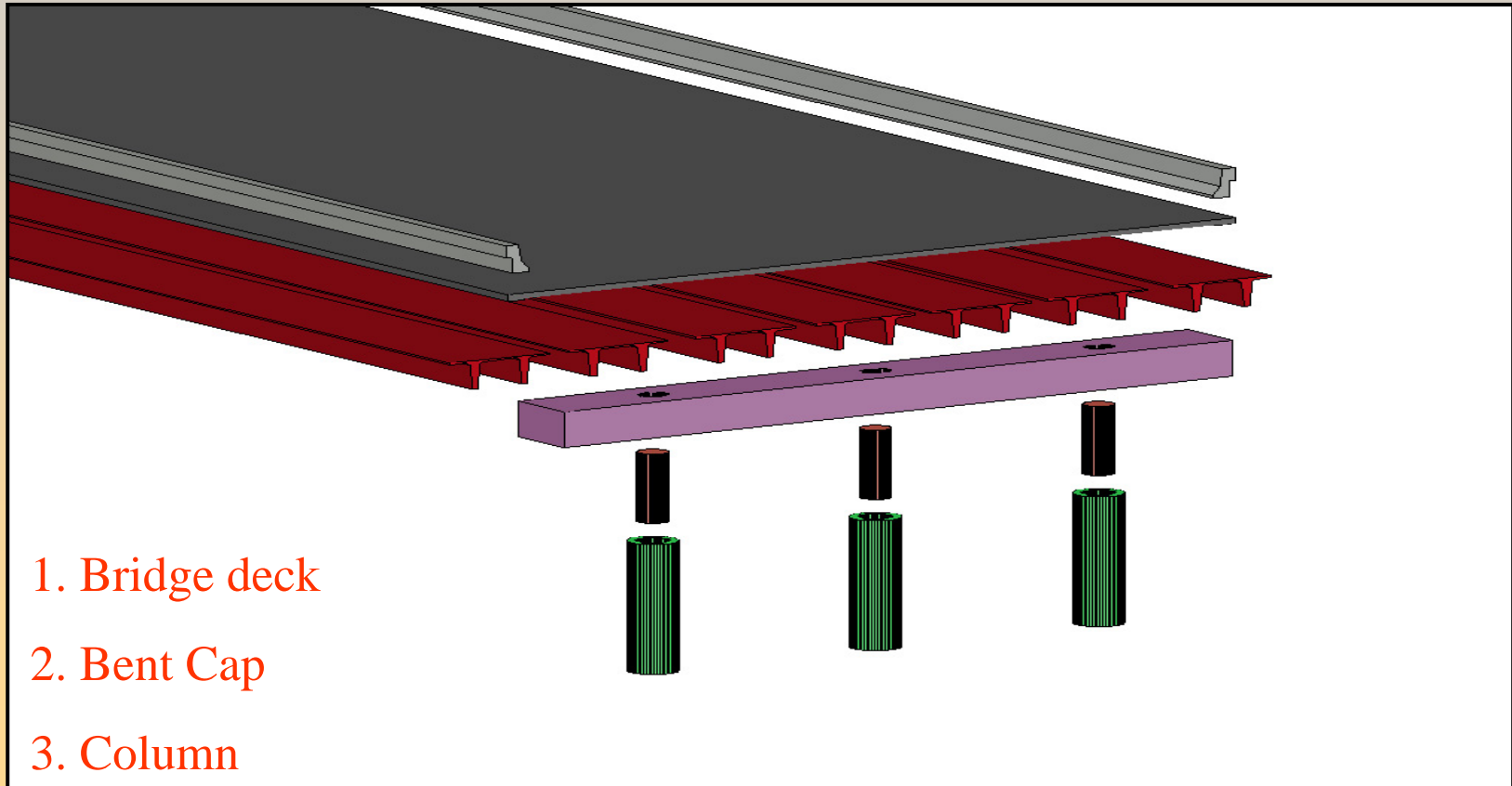
## Caltrans ABC Program

- Perform Research and Development
- Establish a pool of candidate projects for ABC
- Evaluate projects based on developing ABC Selection Criteria
- Engage w/ Industry to develop “practical” details and construction specifications
- ABC Council to provide technical support, facilitate coordination, and provide after-action review



# Research and Development of ABC

Improve seismic performance of prefabricated elements





# ABC Candidate List

D	EA	Cnty	Rte	Description	RTL	Comments
01	43640	DN	101	Dr. Fine Bridge over Smith River	01/15/12	"0" phase; studying CIP segmental and multiple span launching
02	2C110	PLU	089	North Fork Mill Creek and Craig Creek (Replace)	11/06/09	CISS pile foundations; precast abutment seats, pier caps and deck slabs; goal is to reduce construction time from two seasons to one 10-day complete route shutdown
02	37100	SHA	005	Cottonwood Truck Climbing Lanes	12/01/09	Precast I-girders w/optional precast bent cap
02	3C000	SHA	005	5/44 IC	02/09/10	Precast I-girders w/optional precast bent cap
03	1A432	SUT	099	Feather River Bridge +1	04/01/09	210' spliced bulb tees
07	24540	LA	010	10/605 Connector	05/12/11	Planning to use CIP segmental box girder for major span
08	35561	SBd	015	5 bridges near Victorville	04/05/11	Considering precast girders w/steel girders optional; CISS piles, precast bent caps at Mohave River Bridge
10	27980	MER	165	Wolfsen Bridge (Rehabilitation)	09/01/09	Considering closing the highway to avoid stage construction; employ deck bulb tee girders (w/extra wide top flanges) to preclude deck forming



# Selected Caltrans Pilot ABC Projects

I-10 HOV Widening Project

I-10/I-605 Connector Project





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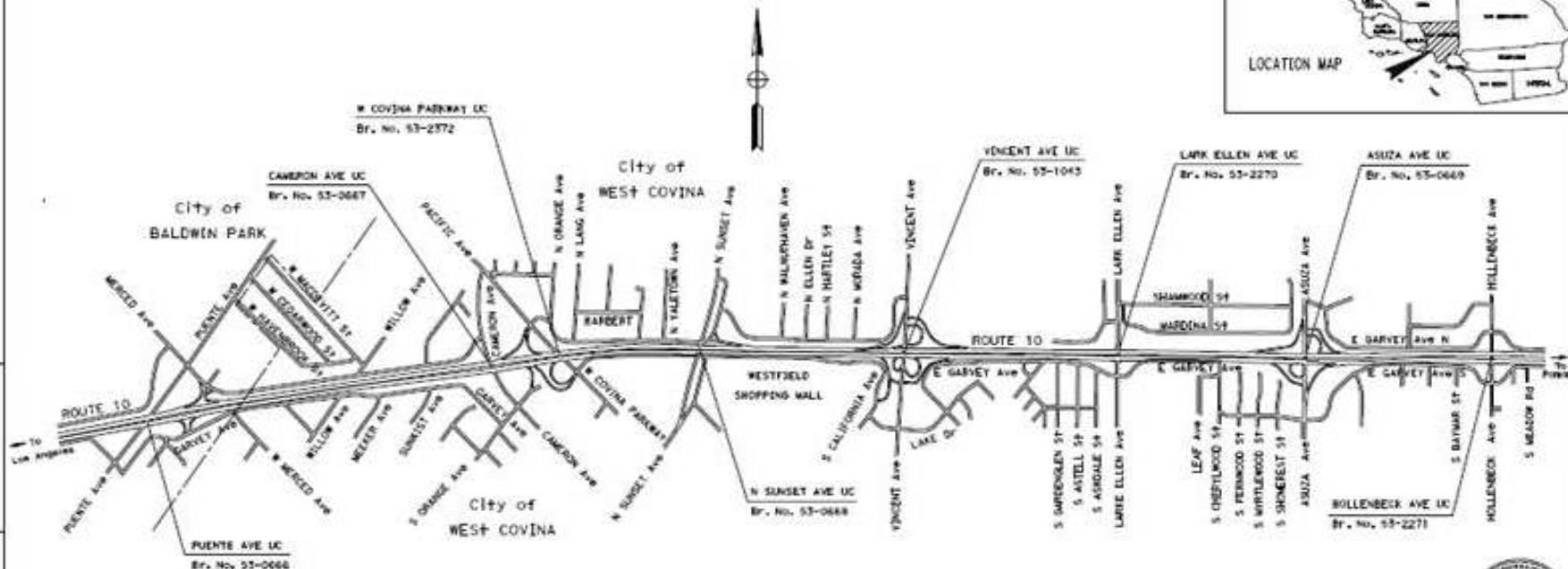


# I-10 HOV Widening Project

INDEX OF PLANS

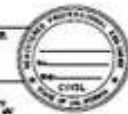
STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
PROJECT PLANS FOR CONSTRUCTION ON  
STATE HIGHWAY  
IN LOS ANGELES COUNTY  
IN THE CITY OF BALDWIN PARK AND WEST COVINA  
FROM PUENTE AVE TO HOLLENBECK AVE

TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006



PROJECT ENGINEER DATE  
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE  
THE SEAL OF CALIFORNIA IS THE PROPERTY OF CALIFORNIA AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.



CONTRACT NO. OT-117804  
CU 00725 EA 117081

BORDER LAST REVISED 4/11/2008 CALTRANS WEB SITE IS [HTTP://WWW.DOT.CA.GOV/](http://www.dot.ca.gov/) RELATIVE BORDER SCALE 1" = 100' (AS SHOWN) DRAWING NO. 4131071 SHEET FILE NO. 1171081001



# I-10 HOV Widening Project

- Widen and restripe both eastbound and westbound I-10 from the City of Baldwin Park to the City of West Covina, CA (~ 7 miles)
- Total 7 bridges to be widened
- Conventional CIP/PS is not desirable due to traffic constraints
- Accelerated bridge construction is driven by schedule issues
- 4 bridges utilize ABC techniques



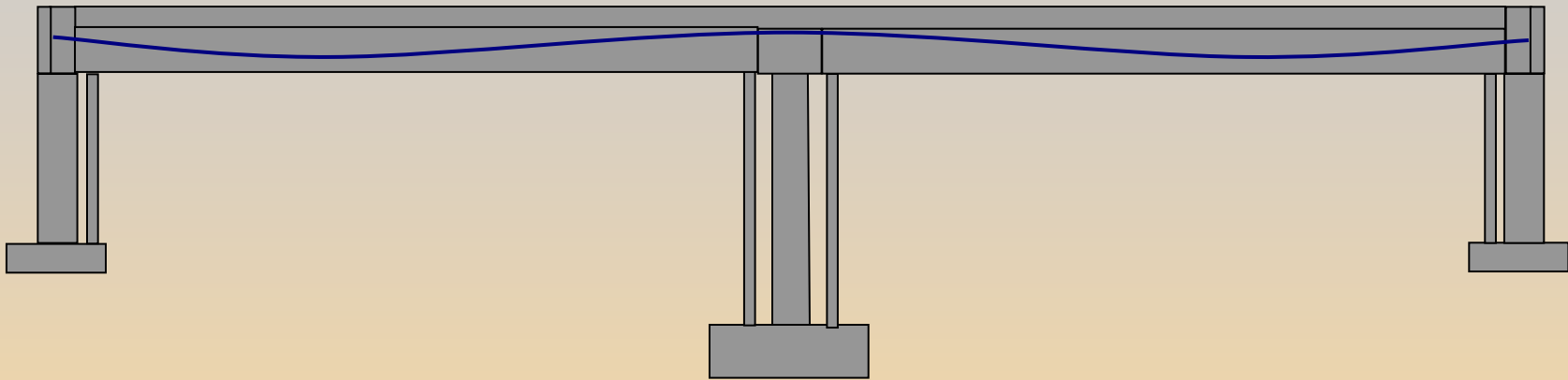
# I-10 HOV Widening Project

## Design Philosophy

- Precast/Prestressed girders
- CIP bridge columns, bents, abutments and deck
- Post tensioning to make continuity



# Construction Sequence

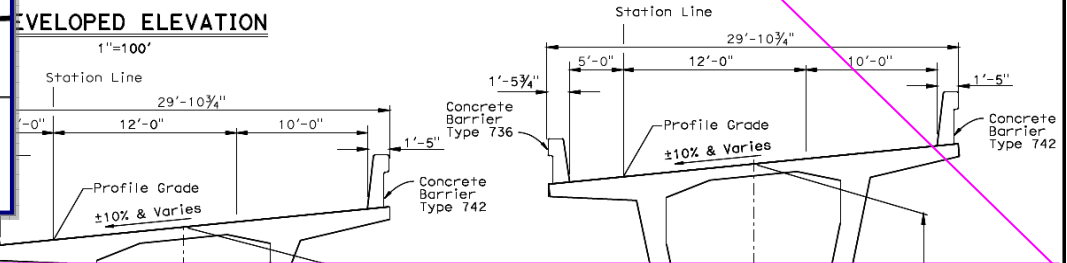
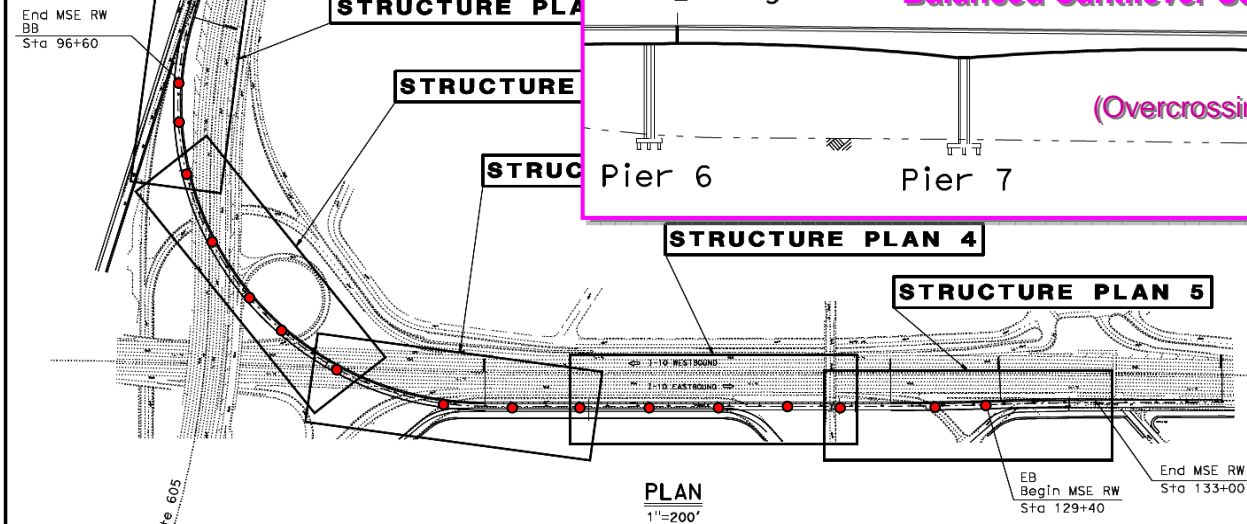
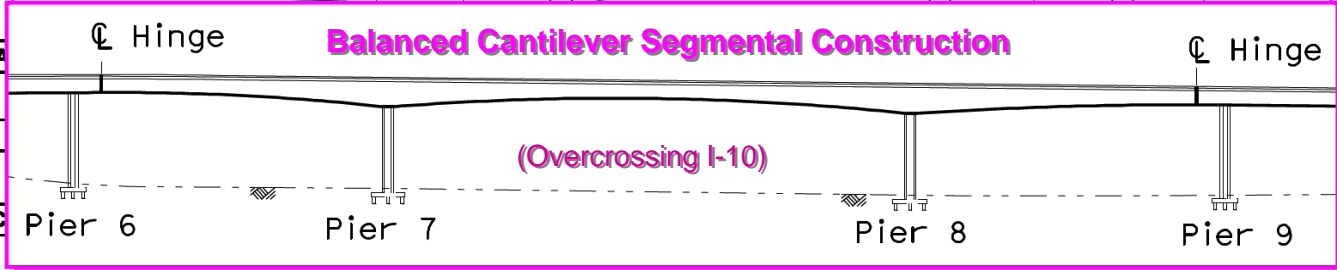
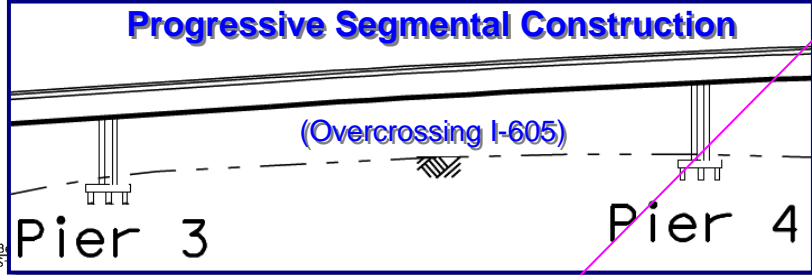


- Step 1: Construct abutments, bent footings and columns
- Step 2: Erect precast/prestressed girders on temporary supports
- Step 3: Construct bent caps
- Step 4: Construct superstructure deck and abutment diaphragms
  
- Step 5: Complete post tensioning
- Step 6: Remove temporary supports



# I-10/I-605 Connector Project

- Project is located in I-10/I-605 interchange, City of Baldwin Park, CA
- Construct single lane 3,280 ft fly over structure to eliminate weaving conflicts
- Structure crossing over both I-605 and I-10
- Long spans and curved bridge
- Over I-605 portion – Use of falsework is not desirable due to required span length and existing undercrossing
- Over I-10 portion - CIP/PS is not desirable due to required span length
- Conventional CIP/PS Box and Segmental Girder hybrid structure is proposed



**SECTION AT PIER 7 & 8**  
1/4"=1'-0"

**ALTERNATIVE 3  
CIP/PS BOX AND  
SEGMENTAL GIRDER  
SHEET 1 OF 6  
GENERAL PLAN**

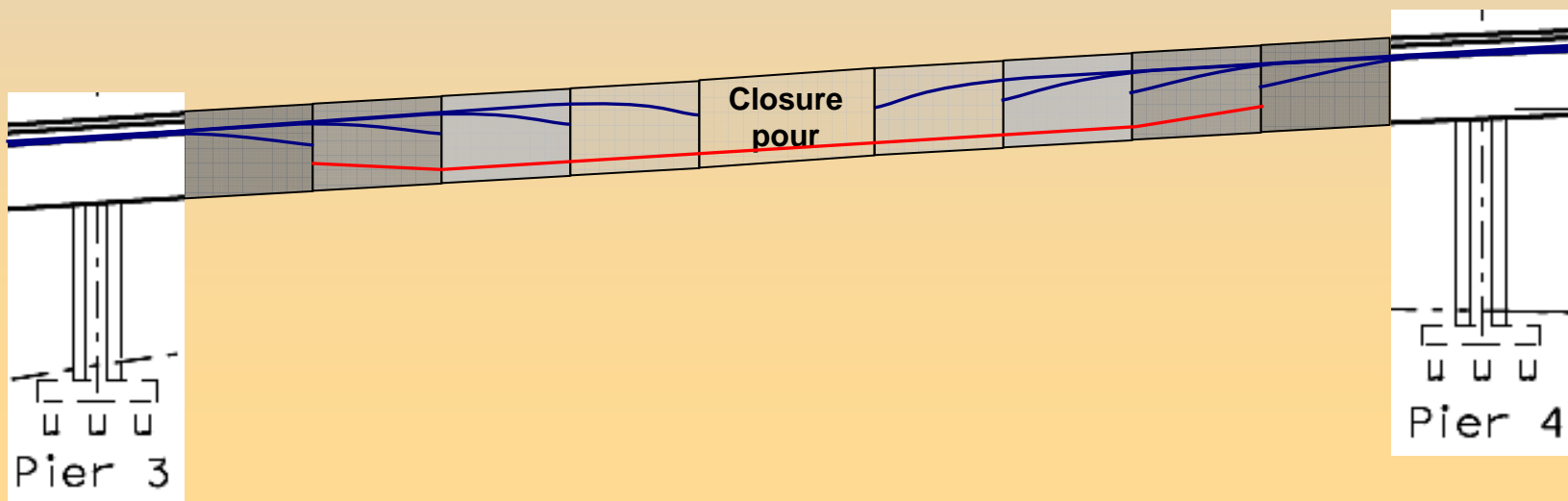
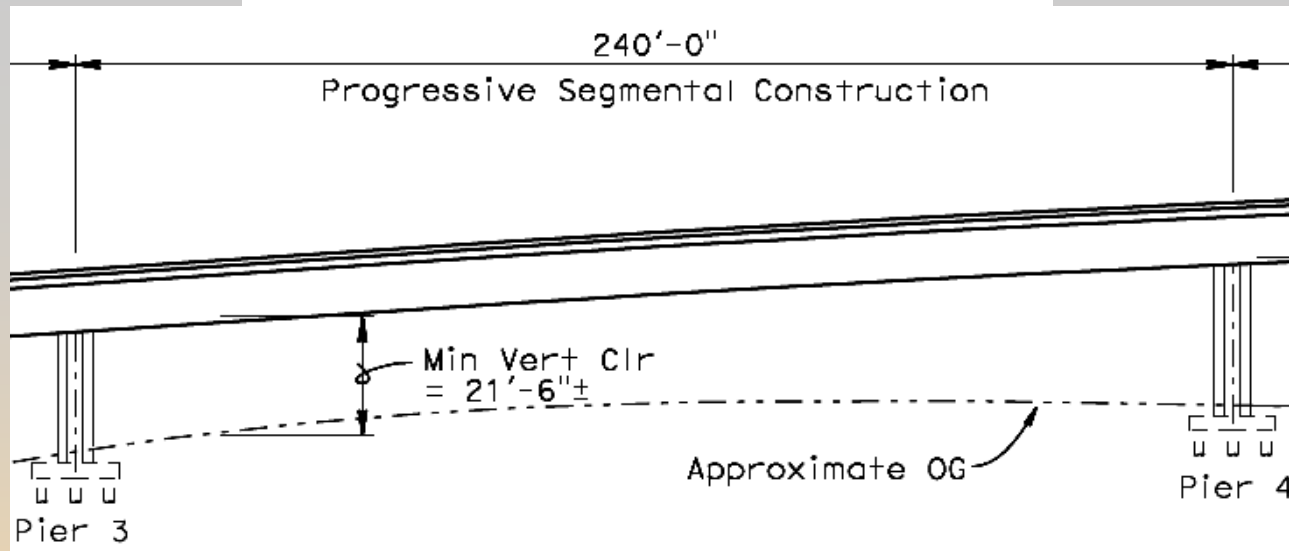
- ASSUMPTIONS**
1. Non-corrosive soils at site.
  2. Soil profile type D.
  3. Peak Bedrock Acceleration PBA = 0.6g
  4. MCE = 7.5
  5. Potential for liquefaction is not a factor.
  6. 24" CIDH piles at Abutments and Pier 2-6 & 9-15
  7. 48" CIDH piles at Piers 7 & 8
  8. Vertical Clearance based on OG = FG

**INDEX TO PLANS**

Sheet No.	Title
1	GENERAL PLAN
2	STRUCTURE PLAN 1
3	STRUCTURE PLAN 2
4	STRUCTURE PLAN 3
5	STRUCTURE PLAN 4
6	STRUCTURE PLAN 5

DESIGNED BY	Jason Fang	DATE	07/27/09
DRAWN BY	Lan T Tran	DATE	07/27/09
CHECKED BY	Paul Chung	DATE	07/27/09
APPROVED	Howard Ng	DATE	07/27/09

<b>STRUCTURE DESIGN BRANCH 20</b>	<b>PLANNING STUDY</b>	
	EB 10/ SB 605 CONNECTOR	
	BRIDGE NO. X	CU 07
	SCALE: Varies	EA 245400





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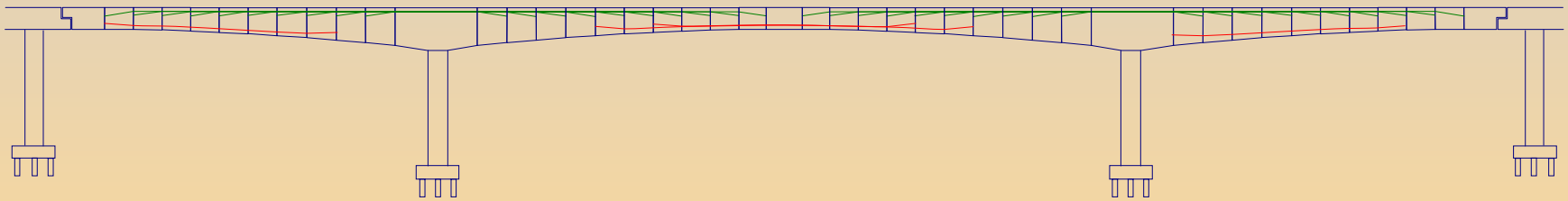
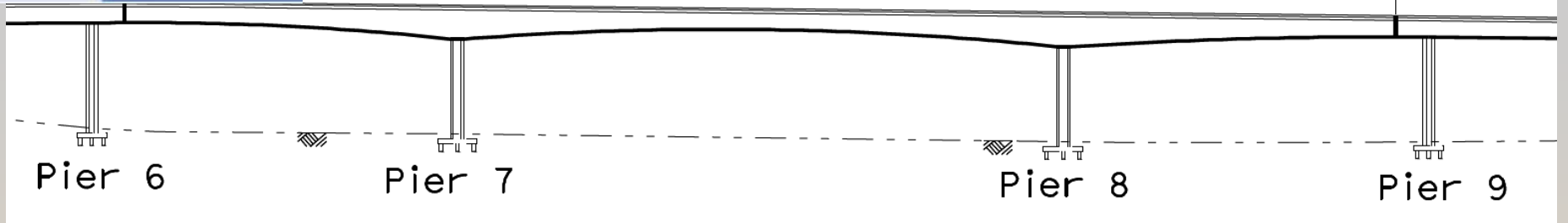
Cantilever Balanced Segmental Construction

368'

222'



⊕ Hinge







## Future Action Item 2009/2010

1. Develop ABC design criterion and standard details
2. Evaluate existing ABC projects and lessons learned
3. Develop formalized APD/ABC Decision Criteria and Matrix
4. Implementation of the formal APD/ABC Decision Criteria and Matrix



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